CLAIMS:

1. A parametric encoder (100, 100') for encoding an audio or speech signal s into sinusoidal code data, comprising:

- a segmentation unit (110, 110') for segmenting said signal s into at least one segment x(n);
- a calculation unit (120, 120') for calculating said sinusoidal code data in the form of the phase and amplitude data of a given extension $\hat{x}(n)$ from the segment x(n) such that the extension $\hat{x}(n)$ approximates the segment x(n) as good as possible for a given criterion ;

characterised in that

the calculation unit (120, 120') is adapted to calculate the sinusoidal code data θ_k^i, d_j^i and e_j^i for the following extension $\hat{x}$:

$$\hat{x} = \sum_{i=1}^{L} Ci = \sum_{i=1}^{L} \sum_{j=0}^{J-1} \left[d_j^i f_j(n) \cos(\Theta^i(n)) + e_j^i f_j(n) \sin(\Theta^i(n)) \right]$$

with

$$\Theta^i(n) = \sum_{k=1}^{K-1} \theta_k^i n^k$$

wherein:

i, j, k	:	represent parameters;
n	:	represents a discrete time parameter;
Ci	:	represents the i'th component of the extension $\hat{x}$;
θ_k^i	:	represents the phase coefficient as one of said sinusoidal data
f_j	:	represents the jth instance out of the set of J linearly independent functions;
Θ^i	:	is a phase; and
d_j^i, e_j^i	:	represent the linearly involved amplitude values of the components representing parts of said sinusoidal data.

2. The parametric encoder according to claim 1, characterised in that $f_j(n) = n^j$.

3. The parametric encoder according to claim 1, characterised in that the calculation unit (120) comprises:

- a frequency estimation unit (122) for determining a plurality of LxK phase coefficients θ_k^i with i=1-L and k=1-K for all components Ci of the extension $\hat{x}$(n) representing the received segment x(n);

- a pattern generating unit (124) for calculating a plurality of L phases $\Theta^i(n)$ with i=1-L from the phase coefficients θ_k^i according to:

$$\Theta^i(n) = \sum_{k=1}^{K-1} \theta_k^i n^k$$

and for generating a plurality of JxL pairs of patterns p_{ij}^1, p_{ij}^2 for the components Ci with i=1-L according to:

$p_{ij}^1 = f_j(n) \cos(\Theta^i(n))$ and $p_{ij}^2 = f_j(n) \sin(\Theta^i(n))$

- for i = 1-L and j = 0-(J-1); and

- an amplitude estimation unit (126) for determining a plurality of JxL amplitudes d_j^i for the patterns p_{ij}^1 and a plurality of JxL amplitudes e_j^i for the patterns p_{ij}^2 of all components Ci of the extension $\hat{x}$;

- wherein the sinusoidal data θ_k^i, d_j^i and e_j^i is at least approximately optimised for the criterion that the weighted squared error E between the segment x and its extension $\hat{x}$ is minimised.

4. The parametric encoder according to claim 1, characterised by a multiplexer (130) for merging said sinusoidal code data into a data stream.

5. The parametric encoder according to claim 1, characterised in that the calculation unit (120') comprises:

- a frequency estimation unit (122') for determining a plurality of K phase coefficients θ_k^i with k=1-K for the component Ci from an input value ε_{i-1}; wherein for the first component C1 with i=1 the input value is set to $\varepsilon_0 = x(n)$;

- a pattern generating unit (124') for calculating the phases Θ^i for the component Ci from said plurality of phase coefficients θ_k^i according to:

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

and for generating a plurality of 2xJ patterns p_{ij}^1, p_{ij}^2 with j=1-J for the component Ci with:

p_{ij}^1 = j(n) cos(Θ^i(n)) and p_{ij}^2 = fj(n)cos(Θ^i(n));

- an amplitude estimation unit (126') for determining a plurality of J amplitudes d_j^1 and of J amplitudes e_j^i for said patterns of the component Ci from the received segment x(n) and from the received plurality of patterns p_{ij}^1, p_{ij}^2;

- a synthesiser (128') for re-constructing the component Ci from said plurality of 2xJ patterns p_{ij}^1, p_{ij}^2 and form the plurality of amplitudes d_j^i and e_j^i according to:

$$\mathrm{Ci} = \sum_{j=0}^{J-1} \left[d_j^i f_j(n) \cos(\Theta^i(n)) + e_j^i f_j(n) \sin(\Theta^i(n)) \right]$$

and

- a substraction unit (129') for substracting said component Ci form the input value ε_{i-1} in order to feed the resulting difference ε_i as new input value forward to the input of the frequency estimation unit (122') for calculating the sinusoidal code data representing the component Ci+1;

wherein the sinusoidal data θ_k^i, d_j^i and e_j^i is optimised for the criterion that the weighted squared error E between the segment x and the extension $\hat{x}$ is minimised.

6. A parametric coding method for encoding an audio or speech signal s into sinusoidal code data, comprising the steps of:

- segmenting the signal s into at least one segment x(n); and

- calculating said sinusoidal code data in the form of phase and amplitude data of a given extension $\hat{x}$ from the segment x(n) such that the extension $\hat{x}$ approximates the segment x(n) as good as possible for a given criterion,

characterised in that

- the extension $\hat{x}$ is defined to:

$$\hat{x} = \sum_{i=1}^{L} Ci = \sum_{i=1}^{L}\sum_{j=0}^{J-1}\left[d_j^i f_j(n)\cos(\Theta^i(n)) + e_j^i f_j(n)\sin(\Theta^i(n))\right]$$

with

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

wherein:

i	:	represents a component Ci of the extension $\hat{x}$ n);
j, k	:	represent parameters;
n	:	represents a discrete time parameter;
f_j	:	represents the jth instance out of the set of J linearly independent functions;
θ_k^i	:	represents the phase coefficient as one of said sinusoidal data
Θ^i	:	is a phase; and
d_j^i, e_j^i	:	represent the linearly involved amplitude values of the components representing parts of said sinusoidal data.

7. The method according to claim 6, characterised in that $f_j(n) = n^j$.

8. The method according to claim 6, characterised in that the frequencies θ_1^i are defined by picking peak frequencies in the frequency domain of the extension $\hat{x}$.

9. The method according to claim 6, characterised in that for fulfilling the criterion that the weighted squared error between the segment x and the extension $\hat{x}$ is minimized the definition of the optimal amplitudes d_j^i and e_j^i comprises the steps of:

- determining a plurality of LxK phase coefficients θ_k^i with i=1-L and k=1-K for all components Ci of the received segment x(n);

- calculating a plurality of L phases $\Theta^i(n)$ with i=1-L from the phase coefficients θ_k^i according to:

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k \ ;$$

- generating a plurality of JxL pairs of patterns p_{ij}^1, p_{ij}^2 for the components Ci with i=1-L according to:

$p_{ij}^1 = f_j(n)\cos(\Theta^i(n))$ and $p_{ij}^2 = f_j(n)\sin(\Theta^i(n))$; and

- determining a plurality of JxL amplitudes d_j^i and a plurality of JxL amplitudes e_j^i for all the pairs of patterns p_{ij}^1, p_{ij}^2 of all components Ci of the extension $\widehat{x}$.

10. The method according to claim 6, characterised in that for fulfilling the criterion that the weighted squared error between the segment x and the extension $\widehat{x}$ is minimized the definition of the amplitudes d_j^i and e_j^i comprises the steps of:

a) setting i= 1

b) $\varepsilon_{i-1} = \varepsilon_0 = x(n)$;

c) determining a plurality of K phase coefficients θ_k^i with k=1-K for the component Ci from an input value ε_{i-1};

d) calculating the phases Θ^i for the component Ci from said plurality of phase coefficients θ_k^i according to:

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

e) generating a plurality of 2xJ patterns p_{ij}^1, p_{ij}^2 with j=0-(J-1) for the component Ci with:

$$p_{ij}^1 = f_j(n)\cos(\Theta^i(n)) \text{ and } p_{ij}^2 = f_j(n)\sin(\Theta^i(n));$$

f) determining a plurality of J amplitudes d_j^i and of J amplitudes e_j^i for said patterns for the component Ci from the received segment x(n) and from the received plurality of patterns p_{ij}^1, p_{ij}^2;

g) constructing the component Ci from said plurality of J pairs of patterns pij and from the plurality of amplitudes d_j^i and e_j^i according to:

$$Ci = \sum_{j=0}^{J-1}\left[d'_j f_j(n)\cos(\Theta'(n)) + e'_j f_j(n)\sin(\Theta'(n))\right]$$

h) substracting said component Ci from the input value ε_{i-1} in order to calculate a resulting difference ε_i;

i) checking if $i \geq L$ wherein L represents a given number of components ;

j) if $i < L$ repeat the method steps by starting again from step c)with $i = i+1$; and

k) if $i \geq L$ the sinusoidal code data of all L components of the extension $\hat{x}$ have been calculated and thus the process has finished.

11. A parametric decoder (400) for re-constructing an approximation $\hat{s}$ of an audio or speech signal s from transmitted or restored code data, comprising:

- a selecting unit (420) for selecting sinusoidal code data representing segments $\hat{x}$ of the approximation $\hat{s}$ from said received transmitted or restored code data;
- a synthesiser (440) for re-constructing said segments $\hat{x}$ from said received sinusoidal code data; and
- a joining unit (460) for joining consecutive segments $\hat{x}$ to form said approximation $\hat{s}$ of the audio or speech signal s;

wherein the sinusoidal code data is a plurality of frequency and amplitude values for at least one component of said segment $\hat{x}$;

characterised in that

- the synthesiser is adapted to re-construct said segments $\hat{x}$ from said sinusoidal code data according to the following formula:

$$\hat{x} = \sum_{i=1}^{L} Ci = \sum_{i=1}^{L}\sum_{j=0}^{J-1}\left[d'_j f_j(n)\cos(\Theta'(n)) + e'_j f_j(n)\sin(\Theta'(n))\right]$$

with

$$\Theta'(n) = \sum_{k=1}^{K} \theta'_k n^k$$

wherein:

i	:	represents a component Ci of the extension $\hat{x}(n)$;
j,k	:	represent parameters;
n	:	represents a discrete time parameter;
f_j	:	represents the jth instance out of the set of J linearly

independent functions;

θ_k^i	:	represents the phase coefficient value as one of said sinusoidal data
Θ^i	:	is a phase; and
d_j^i, e_j^i	:	represent the linearly involved amplitude values of the components representing parts of said sinusoidal data.

12. Decoding method for reconstructing an approximation $\hat{s}$ of an audio or speech signal s from transmitted or restored code data, comprising the steps of selecting sinusoidal code data representing segments $\hat{x}$ of the approximation $\hat{s}$ from said received transmitted or restored code data;

- re-constructing said segments $\hat{x}$ from said received sinusoidal code data; and
- joining consecutive segments $\hat{x}$ together in order to form said approximation $\hat{s}$ of the audio or speech signal s;
- wherein the sinusoidal code data is a plurality of phase and amplitude values for at least one component of said segment $\hat{x}$,

characterised in that

- in said re-construction step the segments $\hat{x}$ are re-constructed from said sinusoidal code data according to the following formula:

$$\hat{x} = \sum_{i=1}^{L} Ci = \sum_{i=1}^{L} \sum_{j=0}^{J-1} \left[d_j^i f_j(n) \cos(\Theta^i(n)) + e_j^i f_j(n) \sin(\Theta^i(n)) \right]$$

with

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

wherein:

i	:	represents a component Ci of the extension $\hat{x}$(n);
j,k	:	represent parameters;
n	:	represents a discrete time parameter;
f_j	:	represents the jth instance out of the set of J linearly independent functions;

θ_k^i	:	represents the phase coefficient as one of said sinusoidal data
Θ^i	:	is a phase; and
d_j^i, e_j^i	:	represent the linearly involved amplitude values of the components representing parts of said sinusoidal data.

13. Data stream comprising sinusoidal code data representing segments $\hat{x}$ of an approximation $\hat{s}$ of an audio or speech signal, wherein the sinusoidal code data is a plurality of phase and amplitude values for at least one component of said segment $\hat{x}$, characterised in that the segment $\hat{x}$ is defined to:

$$\hat{x} = \sum_{i=1}^{L} Ci = \sum_{i=1}^{L} \sum_{j=0}^{J-1} \left[d_j^i f_j(n) \cos(\Theta^i(n)) + e_j^i f_j(n) \sin(\Theta^i(n)) \right]$$

with

$$\Theta^i(n) = \sum_{k=1}^{K} \theta_k^i n^k$$

wherein:

i	:	represents a component Ci of the extension $\hat{x}$(n);
j,k	:	represent parameters;
n	:	represents a discrete time parameter;
f_j	:	represents the jth instance out of the set of J linearly independent functions;
θ_k^i	:	represents the phase coefficient as one of said sinusoidal data
Θ^i	:	is a phase; and
d_j^i, e_j^i	:	represent the linearly involved amplitude values of the components representing parts of said sinusoidal data.

14. Storage medium on which a data stream as claimed in claim 13 has been stored.